Permeability and durability of plain and blended cement concretes cured in field and laboratory conditions

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Abstract: In this investigation, the effects of field and laboratory curing on permeability and durability characteristics of plain and pozzolanic cement concretes were investigated. The field specimens were subjected to moist-curing for 7 days, while the laboratory specimens were water-cured until testing. Water penetration and absorption tests were used as indicators of cement concrete permeability. The durability performance of the field-and laboratory-cured specimens was determined by conducting an accelerated chloride permeability test. The research variables included cement type (i.e., plain and fly ash blended cements), specimen size, and curing conditions. Results indicated that longer moist-curing is helpful in the production of dense and permeable concrete in both plain and blended cements. Water permeability in thick sections was lower than in thin specimens. Irrespective of curing procedure followed, fly ash cement concrete exhibited lower permeability than plain cement concrete after about 1 week of curing. These results indicate that use of properly characterized pozzolans in cement concrete can lead to technological and economic benefits, even in situations where cement concrete cannot be adequately cured due to high rates of evaporation.